

REMARKS

Claims 1-11, 15, 17-24, and 26-29 are pending in the application. Claims 3-11, 22, and 23 have been cancelled by this amendment. Claims 17-20 have been withdrawn from consideration as being directed to a non-elected invention. New claim 30 has been added to the application. Therefore claims 1, 2, 15, 21, 24, and 26-30 are at issue.

Claim 1 has been amended to delete the recitation of an optional hydrophilic compound. This feature of claim 1 has been positively recited in new claim 30, wherein hydrophilic compound is a component of the hydrogel. Support for new claim 30 can be found in original claims 3 and 6, and in the specification at page 5, lines 23-27 and page 6, lines 1-18, for example. The pendency of claim 26 has been changed from claim 1 to claim 30. Claim 24 has been amended to conform in scope to amended claim 1.

The claimed invention is directed to a hydrogel having a specific floatability. The claimed hydrogel separates into two portions of superabsorbent polymer particles upon addition to a container filled with an aqueous fluid. One portion of the particles is hydrophilic sinks to the bottom of the container and hydrogel swelling starts from the bottom in an upward direction. The other particle portion is hydrophobic remains on the fluid surface and swells starting from the top in a downward direction. Separation of the two portions of superabsorbent particles *does not rely upon a density difference*. In particular, the hydrogel does not contain a mixture of superabsorbent polymer particles of different density.

Accordingly, the claimed hydrogel comprises standard superabsorbent polymer particles mixed with and coated by the claimed amounts of a hydrophobic compound and multivalent cation, and, in some embodiments, a hydrophilic compound (see claim 30). A portion of the resulting superabsorbent polymer particles has a sufficient hydrophobic character to float on the surface of an aqueous fluid to start thickening from the surface of the liquid, and the remaining portion of superabsorbent polymer particles has a hydrophilic character and sinks in the aqueous fluid to start thickening from the bottom of the liquid. This is achieved by treating the superabsorbent polymer particles with a hydrophobic compound and a multivalent cation (and in some embodiments a hydrophilic compound), as opposed to admixing of different types of polymer particles, for example, admixing polymer particles having a density of less than one with particles having a density of greater than one.

See Examples 1-31 wherein a *single* commercial superabsorbent polymer (i.e., Hysorb F) was coated with various additives. No example contains a mixture of different superabsorbent polymers.

As stated in the specification at page 5, lines 11-21:

"The amounts of hydrophilic and hydrophobic particles are advantageously chosen such that not only an increased rate of swell but also a partial floating of the superabsorbent particles on the fluid surface at the start of the swelling process is achieved. The additional coating with hydrophobic particles causes a portion of the superabsorbent to remain on the surface of the fluid to be thickened after all the superabsorbent needed has been added to the fluid to be thickened. A further portion of this superabsorbent thus treated slowly sinks into the solution to be thickened, since superabsorbents based on polyacrylates normally have a higher density than the solutions to be thickened. Without treatment, a commercially available superabsorbent would simply just sink into the solution immediately after addition."

The operation of the claimed hydrogel was demonstrated to the examiner in a previously submitted video. The claimed invention also is illustrated in Examples 1-31 at pages 18 and 19 of the specification, and particularly Examples 24-29.

Claims 1, 15, 21, 27, and 28 stand rejected under 35 U.S.C. §103 as being obvious over Klimmek et al. U.S. Patent No. 5,847,031 ('031) in view of Chmelir U.S. Patent No. 5,856,370 ('370). Claims 2, 26, and 29 stand rejected as being obvious over the '031 patent in view of the '370 patent and further in view of Frenz et al. U.S. Patent Publication No. 2002/0128618 ('618 publication). Claims 2, 26, and 29 also stand rejected under 35 U.S.C. §103 as being obvious over the '031 patent in view of the '370 patent and further in view of Karapasha et al. U.S. Patent No. 5,306,487 ('487). Applicants traverse these rejections.

These rejections are based on an assertion that because the '031 patent discloses a polymer composition containing a water-soluble and/or water-swellaable polymers coated with a hydrophobic compound and a multivalent cation, and because the '370 patent discloses adjusting particle density for floating or sinking a particle, a combination of the '031

and '370 patents render the present claims obvious. The '618 publication and the '487 patent are cited as disclosing further claim elements, such as solidification time, blood absorbance, the identity of the hydrophobic compound and the surfactant, and particle size. The examiner however has failed to consider the invention as a whole, and arrives at the claimed hydrogel by an apparent hindsight reconstruction of the claims.

A determination that a claimed invention would have been obvious under §103(a) is a legal conclusion involving four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Secondary considerations of non-obviousness include factors such as commercial success, long-felt but unresolved needs, the failure of others, and/or unexpected results achieved by the claimed invention. *Id.* Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art which the claimed subject matter pertains, who is presumed to have all prior art references in the field of the invention available to him/her. In *re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). Furthermore, obviousness must be determined as of the time the invention was made and in view of the state of the art that existed at that time. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-51 (Fed. Cir. 1988).

The Patent Office must clearly articulate facts and reasons why the claimed invention "as a whole" would have been obvious to a hypothetical person having ordinary skill in the art at least as of the claimed invention's effective filing date. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007) (citing with approval In *re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.")); see also MPEP §2143 ("The key to supporting any rejection under 35 U.S.C. §103 is the clear articulation of reason(s) why the claimed invention would have been obvious.").

To reach a proper determination under 35 U.S.C. §103(a), the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in

the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge of applicants' disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search, and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the *facts* gleaned from the prior art. MPEP §2142.

To establish a *prima facie* case of obviousness, three requirements must be satisfied. First, the prior art references must teach or suggest all the limitations of the claims. In *re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970). Second, as the U.S. Supreme Court held in *KSR International Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727 (2007), "a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. ...it [may] be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was *an apparent reason* to combine the known elements in the fashion claimed by the patent at issue. ...it can be important to *identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements* in the way the claimed new invention does... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." (emphasis added, *KSR, supra*). Third, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *Amgen Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991).

As articulated by the Court of Appeals for the Federal Circuit in *Ortho-McNeil Pharmaceutical Inc. v. Mylan Laboratories Inc.*, 86 USPQ 2d, 1196, 1201-2 (Fed. Cir. 2008):

"As this court has explained, however, a flexible TSM test remains the primary guarantee against a non-statutory hindsight analysis such as occurred in this case. *In re Translogic Tech., Inc.* 504 F.3d 1249, 1257 [84 USPQ 2d 1929] (Fed. Cir. 2007) ("[A]s the Supreme Court suggests, a flexible approach to the TSM test prevents hindsight and focuses on evidence before the time of invention.)."

In addition, the Court in *KSR* held that a factfinder should be aware of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct., 1727, 1742 (U.S. 2007). The examiner may be utilizing the teachings of the specification in an attempt to modify the references to allegedly arrive at the claimed invention. Applicants respectfully note that MPEP §§2142 and 2143 require that the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicants' disclosure. *In re Vaeck*, 947 F.2d 4899 (Fed. Cir. 1991). The mere fact that the prior art may be modified in the manner suggested by the examiner does *not* make the modification obvious unless the prior art suggests the desirability of the modification. *In re Gordan*, 733, F.2d at 902, 221 USPQ at 1127. *In re Fritch*, 23 USPQ 2nd 1780, 1783-1784 (Fed. Cir. 1992). It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. *In re Gorman*, 933 Fed. 2nd 982, 987, 18 USPQ 2nd 1885, 1888 (Fed. Cir. 1991). *In re Fritch*, 23 USPQ 2nd 1780 at 1784 (Fed. Cir. 1992).

The Court in *KSR* held that a patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art (*KSR*, 127 S.Ct. at 1741). The court further emphasized the importance of *identifying a reason* that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does, which the examiner has not provided (*Id.*, emphasis added).

The '031 patent is directed to a polymer composition comprising a water-soluble/water-swellaable polysaccharide, a water-swellaable synthetic polymer, an ionic crosslinking agent, and an antiblocking agent ('031 patent, abstract). The synthetic polymer can be a polyacrylic acid ('031 patent, column 2, lines 61-63). The ionic crosslinking agent

can be $\text{Al}(\text{OH})_2\text{OOCCH}_3 \cdot \frac{1}{3}\text{H}_3\text{BO}_3$. The antiblocking agent can be an aerosol ('031 patent, column 4, line 61 through column 5, line 6). The '031 patent discloses that the anti-blocking agent can be present over a wide range of 0.5-50%, by weight, relative to the water-swellaable polymers, and preferably 5-15%. The amount of crosslinking agent also ranges over 0.001-10%, preferably 3-7%, by weight, relative to the water-swellaable polymers.

However, the '031 patent fails to teach or suggest the amount of hydrophobic compound *and* the claimed amount of multivalent cation that provides the claimed amount of thickening from the surface of an aqueous solution and from the bottom of the aqueous solution. The '031 patent teaches no more than broad range for the hydrophobic compound and for the crosslinking agent, and some specific examples, that achieve the *crosslinking* and *anti-blocking* desired by the '031 patent. The '031 patent is not directed, and does not teach or suggest, the amounts of hydrophobic compound *and* multivalent cation to achieve the claimed feature of thickening from the top *and* the bottom of an aqueous liquid.

As recognized by the examiner, the '031 fails to disclose the claimed ranges of 0.05%-1% of hydrophobic compound and 0.05%-4% multivalent cation. It is these ranges that provide the benefits of the present application. Further, additional claimed embodiments (e.g., claim 30) recite that a hydrophilic compound also is included in the claimed hydrogel. The inclusion of a hydrophilic compounds provides improved results with respect to thickening from both the top and bottom of the aqueous liquid. The '031 patent fails to teach or suggest a combination containing superabsorbent polymer particles, multivalent cation, hydrophobic compound, *and* hydrophilic compound.

The examiner states the '031 patent teaches that the hydrophobic compound and multivalent cation help obtain properties, such as a fast rate of absorption. If all the particles rapidly absorb an aqueous fluid, all the particles would sink to the bottom of the fluid because they would already have absorbed the fluid. The present invention is directed to a balance of hydrophilicity and hydrophobicity to achieve a rapid absorption of a bulk liquid by surface and bottom thickening, rather than maximizing the absorptive properties of the individual polymer particles.

The examiner also states that the claimed ranges of hydrophobic compound would have been obvious because the general conditions of the claims are disclosed, and discovering optimum ranges is only routine. The examiner's analysis is incorrect.

As stated in the MPEP §2144.05 B, only result-effective variables can be optimized. Further the parameter must be recognized as result-effective, i.e., achieve a recognized result, before a determination of an optimum range of the variable can be characterized as routine. See *In re Antoine*, 559 F.2d 618, 195 USQP 6 (CCPA 1977).

The '031 patent only recognizes the hydrophobic compound and multivalent cation as variables relating to absorbency, *not* floatability. Therefore, discovering an optimum range for the *claimed* feature of floatability is not merely routine. Routine experimentation would result in an improved absorbent composition, but *not* a composition having the recited floatability. The same rationale applies to the '370 patent, wherein the variable is density. However, density is not a variable in achieving the benefits of the present invention.

It must further be noted that floatability is related to the amount of hydrophobic compound *and* the amount of multivalent cation (and in some embodiments the presence of a hydrophilic compound). Case law holds that parameter is not a result effective variable if multiple other parameters can effect a recognized result. See *In re Antonie*. Because more than one variable affects the claimed feature of floatability, the examiner cannot rely upon optimization or result-effective variable rationales to support the obviousness rejection of the claims over the '031 patent.

At paragraphs 8-10 of the Office Action, the examiner properly notes that the '031 patent fails to teach "floatability, which is an important feature of the claimed invention. The examiner further states floatability is merely a desired property. However, floatability is *defined* in the claims as the result achieved, i.e., 40% to 90% of an aqueous solution or suspension is thickened from the surface of the solution or suspension and the remainder from the bottom. Therefore, floatability is defined, as are the features needed to achieve this feature, i.e., superabsorbent polymer particles and defined amounts of hydrophobic compound and multivalent cation (and in preferred embodiments a hydrophilic compound).

The '031 patent discloses no more than a wide range for a hydrophobic compound and a multivalent cation, with no suggestion that would lead a person skilled in the art to the narrow claimed ranges that provide the floatability defined in the present claims. Even though the '031 patent discloses hydrophobic compounds and multivalent cations, there is *no* disclosure of the amounts needed to achieve thickening of a liquid from the top and the bottom. Changing the absolute and relative amounts of a hydrophobic compound and multivalent cation on a superabsorbent polymer changes the property of the particle drastically. The examiner is directed to Examples 24-29 of the specification wherein minor changes in amounts of hydrophobic compound and multivalent cation have a substantial effect on blood absorbance (BA), solidification time (ST), and floatability (SV).

Rather than reciting a new use for an old composition, applicants are reciting a narrow range of individual compounds within a broad disclosed range of for each of these compounds. In this case, applicants have shown expected results within the claimed range for the hydrophobic compound and multivalent cation that could not have been predicted from the broad ranges disclosed in the '031 patent. See MPEP §2144.05 III.

The '370 patent cited by the examiner does not overcome the deficiencies of the '031. The examiner cites the '370 patent solely for a teaching of adjusting density to provide floating and sinking particles. However, the examiner misunderstands the claimed invention, which is not directed to a mixture of superabsorbent particles of different densities. The invention is directed to surface treated superabsorbent particles with the specified amounts of hydrophobic compound and multivalent cation (and in some embodiments a hydrophilic compound).

In the present invention, a percentage of the particles are sufficiently hydrophobic to float and a percentage are sufficiently hydrophilic to sink. Accordingly, thickening of the liquid occurs from the top and the bottom of the liquid. Density is not a relevant parameter. All particles in the claimed composition have the same density, but the surface properties have been altered.

With respect to claim 27, the '031 patent does not teach a surfactant. At column 3, line 64 through column 4, line 2, the reference discloses *crosslinkers* that are

consumed during a crosslinking reaction. Therefore, any compound listed in this portion of the '031 patent is not available to perform as a surfactant (assuming the compound even had surfactant properties prior to a crosslinking reaction.)

For all the reasons set forth above, it is submitted that claims 1, 15, 21, 27, and 28 would not have been obvious over a combination of the '031 and '370 patents, and that the rejection under 35 U.S.C. §103 should be withdrawn. It is further submitted that new claim 30 is patentable over a combination of the '031 and '370 patents.

Claims 2, 26, and 29 stand rejected over the '031 patent in view of the '370 patent, and further in view of Frenz et al. U.S. Patent Publication 2002/0128618 ('618 publication). Applicants traverse this rejection.

With respect to claim 2, the examiner's comments fail to provide any factual underpinning to support the rejection. The examiner is relying upon test data and methods used to test for *water* absorbance. Blood absorbance is completely different and is not taught or suggested by the references. With respect to the flow test, it demonstrates absorption of water from a paper cloth. Note that almost all Examples 1-20 of the '031 patent contain a rating of "D", i.e., gel is present in separated form ('031 patent, column 8, line 49). Therefore, the '031 patent shows that the particles disclosed therein *do not* solidify. In fact, the '031 patent is attempting to *avoid* solidification by addressing the problem of gel blocking, i.e., see '031 patent, column 2, lines 42-46.

The '031 and '370 patent references fail to teach or suggest every element recited in claim 2, and therefore cannot render claim 2 obvious. The '618 publication does not overcome the deficiencies of the '031 and '370 patents. The examiner is co-mingling *three* entirely different tests to reconstruct the claimed invention, i.e., the CRC test, the FSR test, and the vortex test at paragraphs [0018]-[0021], [0037], and [0038] of the '618 publication. Randomly selecting individual numbers from different tests using different methodologies cannot be properly used to support an obvious rejection. The examiner has failed to provide *proper* and sufficient reasoning to support the rejection, which appears to be a hindsight reconstruction of claim 2.

With respect to claim 26 and new claim 30, the '618 patent merely discloses that a steric spacer, e.g., a silica, can be added to superabsorbent polymer particle. The '618 patent makes no differentiation between a hydrophobic and hydrophilic silica. The reference provides no incentive to further add a hydrophilic silica to a superabsorbent particle coated with a hydrophobic compound and a multivalent metal cation with any reasonable expectation of providing particles having the floatability recited in the present claims.

With respect to claim 29, the '618 patent at paragraph [0057] does not teach a sorbitan ester as a surfactant. Applicants also fail to see where the '031 patent discloses surfactants.

The '618 publication is relied for a teaching of sorbitan esters. However, the portion of the '618 publication relied upon by the examiner (i.e., paragraph [0057]) discloses the use of a sorbitan fatty acid ester as a *crosslinker* to use in the polymerization of a monomer, like acrylic acid. See start of paragraph [0057] ("Useful crosslinker include...") and start of paragraph [0058] ("The crosslinkers are present in the reaction mixture...")

The sorbitan fatty ester of the '618 publication therefore is consumed in the polymerization reaction that forms the superabsorbent polymer. This is in contrast to the present claim 29 that recite a sorbitan ester *surfactant* mixed with the other claimed ingredients of the composition of claim 1. The '618 publication fails to teach a sorbitan ester that is added to an already formed superabsorbent polymer particle. The sorbitan fatty acid ester of the '618 patent is consumed and therefore is unavailable as a surfactant.

The examiner points to paragraph [0014] as showing that the sorbitan ester improves permeability. This is incorrect. The '618 publication is directed to a superabsorbent polymer having the features recited in paragraph [0018], which can be achieved by using any of the starting materials (monomer, crosslinker, surface crosslinker) disclosed in the reference. Further, as stated above, the sorbitan fatty ester is consumed in the reaction.

Further, claim 29 recites a preferred embodiment of the present invention, and applicants do not rely solely upon the features of claim 29 for patentability. Applicants do

rely however upon the features recited in claim 29 *and* in claims 1 and 27 from which it depends for patentability. Applicants have set forth reasoning why claim 1 is patentable over the cited references, and the '618 publication does not negate the patentability of independent claim 1. It is submitted therefore that claim 29 is patentable over the cited references for the same reasons independent claim 1 is patentable over these references, and that the rejection of claim 29 under 35 U.S.C. §103 should be withdrawn.

Claims 2, 26, and 29 stand rejected under 35 U.S.C. §103 as being obvious over the '031 patent in view of the '370 patent in further view of Karapasha et al. U.S. Patent No. 5,306,487 ('487). Applicants assume that the Office Action contains a typographical error and that this rejection is directed to claim 24. Applicants traverse this rejection of claims 2, 24, and 29.

First, the examiner's rationale to support the rejection is faulty. The examiner argues that the smaller particles, as recited, would increase fluid uptake. However, the recited particle size is that of the *hydrophobic* compound, which does not absorb aqueous fluids. The examiner has misinterpreted the claim and the art, and such errors were recently found to be harmful, and as such a conclusion of obviousness based on the misinterpretation can be called into question (*In re Chapman* (CAFC 2009-1270, Feb. 2010)).

The examiner also incorrectly states that particle size provides floatability. In the present application, the particle size of the hydrophobic compounds is much smaller than the particle size of the superabsorbent polymer particle, which controls any size related arguments. Further, it is the hydrophobicity of the hydrophobic compound, and the amount of hydrophobic compound, that primarily contributes to the claimed floatability of the claimed particles.

Finally, claim 24 recites a preferred embodiment of the present invention, and applicants do not rely solely upon the features recited in claim 24 for patentability, but rather rely upon the features recited in independent claim 1 and in dependent claim 24 for patentability.

For all of the reasons set forth above with respect to the patentability of the present claims over the '031, '370, and '487 patents and the '618 publication, it is submitted that the pending claims are patentable over any combination of the four above-identified references and that the rejection should be withdrawn.

It is submitted that all pending claims are in a form and condition for allowance. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

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